IMPERIAL
DEPARTMENT OF AGRICULTURE
FOR THE WEST INDIES.

REPORT

ON THE

AGRICULTURAL DEPARTMENT,

ST. VINCENT.

1913-14.

BARBADOS:
ISSUED BY THE IMPERIAL COMMISSIONER OF AGRICULTURE
FOR THE WEST INDIES.

1914.

[Price Sixpence.]

REPORTS

ON THE

BOTANIC STATION, ECONOMIC PLOTS, AND AGRICULTURAL EDUCATION, ST. VINCENT.

Annual Reports on Certain Economic Experiments conducted in connexion with the Botanic Station, 1900-2.

Annual Reports on the Botanic Station for the years 1901 and 1902.

Annual Reports on the Botanic Station, Economic Experiments, and Agricultural Education for the years 1902-3 to 1913-14.

SUGAR-CANE EXPERIMENTS.

IN BARBADOS.

Report of the Agricultural Work for 1900:—
Manurial Experiments and Experiments with Varieties of Sugar-cane.

Report of the Agricultural Work for the seasons 1899-1901 to 1908-10.
Parts I and II; Manurial Experiments. Part III; Varieties of Sugar-cane.

IN THE LEEWARD ISLANDS.

Report on Experiments conducted with Sugar-canes in the season 1899-1900.

Reports on Experiments conducted with Sugar-canes in the seasons 1900-1 to 1909-10.

Part I; Varieties of Sugar-cane. Part II; Manurial Experiments.

Sugar-cane Experiments in the Leeward Islands, 1911-12 and 1912-13.

Parts I and II published together in Royal 8vo.

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LETTER OF TRANSMITTAL.

Commissioner of Agriculture—to His Honour the Administrator, St. Vincent.

Barbados,

No. V. 338.

February 5, 1915.

Sir,

I have the honour to forward, herewith, the Report on the Agricultural Department, St. Vincent, for the year ended March 31, 1914.

2. The irregular distribution of the season's rainfall affected adversely the harvesting of the colony's cotton crop. The total value of the exports, therefore, showed some decline compared with those of the last two years.

3. The yields of arrowroot were good.

4. As regards work in the Botanic Garden and Experiment Station, much useful information is recorded in the report. The road through the Garden to Government House has been widened, and the good condition of the Garden maintained.

5. Experiments have been started in connexion with the manuring of cotton and arrowroot. The full benefit of this work will not be available until after the lapse of several years' trial.

6 7. Attention may be called to the work that is being done on cotton selection, which includes hybridization, resistance to disease, microscopic examination for fineness of lint, yield of 4-locked bolls, and the usual selection for public seed supply.

7 8. Interesting results are recorded in connexion with the cultivation of crops on banks, compared with their cultivation on the flat.

8 9. A useful estimate is published to show the relative value of dried cassava roots and cassava starch, in relation to their exportation.

9 10. Progress in the minor industries is shown to be satisfactory.

10 11. The Report of the Government Veterinary Surgeon states that two cases of anthrax occurred during the year under review, in a locality favourable for the occurrence of this disease. Prompt measures were taken to prevent further outbreaks.

11 12. In conclusion, I have to express my appreciation of the Department's good work, much of which cannot be recorded in the limited space of an Annual Report.

I have, etc.,

(Sgd.) FRANCIS WATTS,

Commissioner of Agriculture,
for the West Indies.

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ERRATUM.

For '(*Tephrosia candida*)' read, 'as well as *Tephrosia candida*'.

REPORT ON THE AGRICULTURAL DEPARTMENT, ST. VINCENT,

For the Year ended March 31, 1914.

Work in Botanic Gardens and Observations on Plants.

A marked improvement to the Gardens has been the widening of the road leading through the Gardens to Government House. This road has a total length of 387 yards, 198 yards coming within the Gardens proper, the remainder passing through the Government House Grounds. The widening of the portion within the Gardens necessitated making a concrete drain, several culverts, and a retaining wall.

Carriages and motors can now be driven through the Gardens to Government House along a pleasanter road, and of easier gradient than the one outside the Garden boundaries, which, up to the present, has been the general route.

On two occasions, during April and July, the white-headed fungus (*Ophionectria coccicola*) was imported from Dominica and St. Lucia. Some was placed on limes in the Gardens and some sent to Bellewood estate. Despite constant attention in the matter of syringing during dry weather, the fungus failed to spread to the scale insects on the trees to which the imported specimens were attached.

As a result of the close trimming of the large mango and Java plum trees, very little black blight has been in evidence. On the smaller economic and ornamental shrubs, scale insects have been kept in check by constant applications of 'scalo'.

A small plantation of limes in the Government House Grounds has been kept clear of scale insects by the same means, but the frequent applications found to be necessary provide an example of the persistence of these pests on limes, and the apparent hopelessness of attempting any cultivation of citrus on a large scale in the island; although why the detrimental effects of scale insects on citrus trees should be more pronounced in this island than in other places where the same pests are present, is a problem still unsolved.

The 'Stoppeur' compressed air spraying machines obtained last year have proved invaluable for the application of 'scalo'.

The following plants were added to the collection:—

Camoensia maxima, *Bougainvillaea spectabilis*, var. Cherry Ripe, *Wormia Burbidgei*, *Eugenia uniflora*, *Calpurnia aurea*, *Thysanolaena Agrostis*, *Colubrina reclinata* ('Mawbee'), *Aleurites Fordii*; *Fagraea Zeylanica*.

Work in the Nurseries and Distribution of Plants.

Sufficient economic and ornamental plants were raised to fill the local demand. A quantity of mahogany seedlings were supplied for the afforestation of Crown Lands.

The following plants, cuttings, etc. were distributed :—

In pots.		*Not in pots.*	
Cacao	2,400	Sugar-cane (selected varieties) ...	8,600
Nutmeg	108	Para rubber stumps	200
Eucalyptus	77	Gliricidia (cacao shade)	2,000
Grafted mango	17	Palms	67
Hardwood trees	60	Hippeastrum equestre	600
		Foliage and flowering	200
Total ...	2,662	Total ...	11,667

Produce sold included 127 lb. of cured cacao.

PLANT AND SEED IMPORTATIONS.

Seeds of the following species were received and sown :—

Barosma serratifolia, B. betulina, from the Head Office of the Imperial Department of Agriculture; *Camoensia maxima, Sterculia alata, Odontadenia speciosa, Dimorphandra Mora,* from the Botanic Gardens, Trinidad; *Kokia rockii, Juniperus pachyphlaea,* from the United States Department of Agriculture; *Wormia Burbidgei,* from the Botanic Gardens, Dominica; *Eugenia uniflora, Calpurnia aurea, Bauhinia purpurea, Cupressus* [sempervirens] *horizontalis,* from the Botanic Gardens, Antigua; *Ardisia humilis, A. Pickeringia, A. Wallichii, Asystasia coomandeliana, Cocos amara, C. schizophylla, Euterpe Jenmani, Peltophorum dasyrachis, Pritchardia Thurstonei, Sabal Adansoni, S. minu,* from the Botanic Gardens, British Guiana; *Areca sapida, A. madagascariensis, Nephrosperma Van-Houtteana, Dictyosperma alba.*

Plot Experiments at the Botanic and Experiment Stations.

BOTANIC STATION.

The selection of cotton, which was commenced in 1910 with the object of obtaining a type suitable for the wet districts of the island, was continued. Seed was again saved from the plants which showed the greatest resistance to fungal and bacterial diseases, coupled with the tendency to open the largest number of bolls under very adverse weather conditions.

The Botanic Station is eminently suitable for selection work with the above object, as its rainfall is much greater than that of the Experiment Station, where most of the experimental and selection work is done.

The following figures comparing the rainfall for the two places during the last seven months of the year will serve to illustrate this fact. The rainfall, in inches,

for the Botanic Station, was as follows: June 10·61; July 8·00; August 14·48; September 15·07; October 22·13; November 15·55; December 5·52. For the Experiment Station: June 8·41; July 6·43; August 10·98; September 12·95; October 18·80; November 13·99; December 2·94. The totals are as follows: Botanic Station 91·36; Experiment Station 74·50; the difference being 16·86 inches more at the Botanic Station than that recorded for the same seven months at the Experiment Station.

This season some of the selected seed was grown at Peniston estate where the precipitation is practically the same as that of the Botanic Station. Owing to the every wet picking season no cotton in such a locality could be expected to give a good return, but the selected plants produced 160 lb. of lint per acre as against only 50 lb. per acre from the unselected. Further, the price obtained for the lint from the selected plants was higher than that obtained for the rest of the crop. This is probably due more to the better condition of the lint, as a result of the plants being more resistant to disease, and the bolls able to open better in wet weather, than to any superiority in the intrinsic quality of the lint; for this particular variety is by no means one of the long or fine staple types.

THE EXPERIMENT STATION.

Cotton being the staple crop of the Colony, most of the time and space at the Experiment Station is devoted to it. The objects aimed at are—to be in a position to supply seed of any type of Sea Island cotton that a planter may require for a particular locality, or according to the requirements of the market; to maintain or improve the quality of the types grown; to record reliable information as regards the use of manures, and as regards the comparative yields. With these ends in view, a good deal of selection work is done; a little hybridization is carried out, and as much accuracy as possible is observed with the manurial experiments.

Several other crops are grown, some with the sole object of keeping a stock of the best varieties on hand for distribution, but others for obtaining information and statistics that are likely to be of use.

In all the experimental work undertaken by the Department an attempt is made to keep in touch with the demands of the Colony. This will be seen more especially in the cotton selection work, and in the efforts made to discover and establish an industry to supplement those of cotton and arrowroot.

EXPERIMENTS WITH SEA ISLAND COTTON.

MANURIAL EXPERIMENTS.

These experiments were commenced last season and, as anticipated, only negative results have been obtained.

The low yields are due to the very adverse weather conditions of the reaping season, and this also may be largely responsible for the discrepancy between similarly manured plots in different series, although this discrepancy would undoubtedly be present to some extent were the weather conditions favourable; for, on fairly fertile land, several years must always elapse before reliable and definite results can be obtained from manurial experiments.

The following table shows the results of the manurial experiments with Sea Island cotton for the second season :—

MANURIAL EXPERIMENTS.

No. of experiment.	Nitrogen, lb. per acre as sulphate of ammonia.	Potash, lb. per acre as sulphate of potash.	Phosphoric acid, lb. per acre as basic phosphate.	Cotton-seed meal, lb. per acre.	Seed-cotton, lb. per acre.			Mean.	Difference on No Manure.
					Series 1.	Series 2.	Series 3.		
1.	...	No	Manure	...	789	578	352	573	...
2.	30	...	...	...	719	471	396	528	- 45
3.	...	...	40	...	545	438	391	458	-115
4.	...	30	...	...	852	547	417	605	+ 32
5.	...	30	40	...	647	555	302	501	- 72
6.	30	30	40	...	594	479	382	485	- 88
7.	...	...	...	600	759	383	199	447	-126
8.	..	30	40	600	712	539	349	533	- 40

The seed planted was an ordinary estate type.

PLANT SELECTION FOR RESISTANCE TO DISEASE COUPLED WITH DESIRABLE CHARACTERS.

As stated in last year's report, the selection experiments have been continuous since the season of 1909-10. Before ginning the seed-cotton of the eighty-six selections made last season, the average length of lint from each plant selected was determined. This was done mainly to facilitate selection work. When the average lint length of a parent plant is known, selections can be made from its progeny before the bolls open, which otherwise would be impossible if one wished to take the lint character into consideration. Early selection has the advantage of enabling the seed-cotton from the selected plants to be kept separate from the beginning, and so allowing the weight of seed-cotton from each individual to be ascertained, and the yield taken into consideration when selecting from its progeny.

In response to the recent advice of spinners to breed for fineness, because of the competition between the finer types of Egyptian cotton and coarse Sea Island, increased attention has been paid to the superfine types. As the accompanying table shows, the selections in three types of superfine have increased from fourteen last year to over sixty this season.

Two of the types, M. and Pauls, which figured in last season's experiments were discarded as being inferior in stamina to other similar types grown.

The purchase of a microscope with a micrometer eye-piece has enabled the diameter of the lint to be ascertained and reckoned in with the other characters in selection work. Although it is generally accepted that diameter of fibre is not altogether synonymous with the spinner's term 'fineness', yet it is significant that, of the lints measured, the highest priced cottons proved to be the finest by measurement. The method adopted was that described by Mr. Thornton, in

the *West Indian Bulletin* (Vol. VII, No. 2, p. 163). Five mounts were made, twenty fibres measured from each mount, and the average of the 100 measurements ascertained.

Marked variation from type was noticed amongst the plants of some of the selections. The chief were as follows: Selections 6, 7, and 8 in V. 1 were more closely branched and heavily bolled than others of the type; No. 20 in V. 1 was noticeable for its great freedom from anthracnose; Nos. 22 and 23 in V. 1 were very compact plants with large bolls and a short growing season; No. 44 in V. 7 produced also compact plants with large bolls. These and other characteristics were noted, and the progeny will be watched carefully next season.

TABLE SHOWING RESULTS OBTAINABLE BY EXAMINATION OF COTTON FROM SELECTED PLANTS.

Number.	Class.	Individuals selected 1912-13.	Individuals selected 1913-14.	Yield seed-cotton per acre, lb.	Ginning, per cent. of lint.	Lint index, grams.	Average length of lint, mm.	Average diameter of lint, mm.	Per cent. of weak fibres.
V. 1	Ordinary fine Sea Island ...	24	55	523	25·6	4·4	49	·01472	34·0
V. 2	'Superfine' Sea Island ...	1	28	399	24·4	4·8	52	·01383	33·3
V. 3	Fine Sea Island ...	13	12	372	20·0	4·1	49	·0138	41·5
V. 4	Ordinary fine Sea Island ...	none	10	315	20·7	4·4	47	·01388	43·2
V. 5	'Superfine' Sea Island ...	9	18	452	25·0	4·0	48·5	·0139	40·0
V. 6	'Superfine' Sea Island ...	4	25	312	25·9	4·1	49	·0129	40·5
V. 7	Ordinary fine Sea Island ...	27	14	497	25·7	3·9	48·5	·01562	33·3
V. 10	Egyptian fine Sakellarides ...	none	5	285	32·4	5·8	37	·01496	32·8

SELECTION OF PLANTS BEARING 4- AND 5-LOCKED BOLLS.

Types V. 1 and V. 4 were found to produce a fairly large number of bolls with four loculi, and selections were commenced last season to ascertain how far this is a constant character, and the possibility of increasing the proportion of such bolls on those types prone to produce them. The method followed was first to select a few plants bearing a large number of 4-locked bolls, and then to save the seeds from such bolls and sow those produced by each boll separately. The resulting plants were found to bear an abnormal number of 4-locked bolls, and in some cases a few 5-locked bolls, so the selection was continued this season.

It was supposed that a 4-locked boll would produce more seeds, and consequently a greater amount of lint than a 3-locked, and this supposition has proved to be correct. The seeds from nine 3-locked were counted, and also those from nine 4-locked. The results were as follows:—

Number of seeds from nine 3-locked: 22, 21, 18, 18, 23, 20, 21, 19, 21, making a total of 183. Number from nine 4-locked: 28, 26, 27, 25, 26, 25, 28, 26, 28, making

a total of 239. Thus the average number of seeds from the 4-locked was 26 against an average of 20 from the 3-locked. The difference in weights is as follows:—

The twenty 3-locked bolls from V. 1 yielded 58·6 grams of seed-cotton (42·2 grams of seed and 16·4 grams of lint), as against 76·4 grams seed-cotton (55·4 grams seed and 21 grams lint) from twenty 4-locked bolls from the same V. 1 type.

Eighteen 4-locked bolls and two 5-locked were selected this season.

HYBRIDIZATION.

V. 10 × V. 1 (Sakel. × Sea Island ordinary). The plants of the F. 1 generation of this cross were intermediate in most of the characters noted. They were taller than the V. 1 Sea Island type but not so tall as the Sakel. type. In no case was the height intensified.* The type of branching was more or less intermediate, i.e., many strong secondary branches were developed, which bore flowering branches. but there was also the production of flowering branches direct from the main stem, (The Sakel. parent has the monopodial branching habit, whilst the branching of Sea Island is sympodial). The bolls opened wide, similar to the Sakel. habit, but the lint was not so easily blown from them as from the Sakel. bolls. In shape the bolls resembled the Sea Island. The lint length was also intermediate, most of the plants giving an average length of 45 mm., as against 38 mm. in the Sakel. and 49 mm. in the V. 1. In no case was the lint length intensified as has been observed in some cases of hybridization.* The seeds had a tuft of fuzz at each end, but were not so fuzzy as the Sakel. seeds, which they were expected to resemble in this character. The plants of the reciprocal cross (Sea Island ordinary × Sakel.) were similar.

Flowers on seventeen of these plants were selfed for sowing next season.

V. 1 × V. 5. The F. 1 generation showed the tertiary branching character of V. 5, which thus appears to be dominant. The tertiary branching referred to is very pronounced in V. 5. On some plants, bolls are produced from the main stem in the axil of nearly every main branch, and a great number are also produced in the axils of the secondary branches. These 'tertiary' branches are typical fruiting branches, i.e., they consist in some cases of a boll only, and in others of two or three bolls with, in the majority of cases, not more than one leaf. This branching habit tends to the production of a large number of bolls per plant. As stated in the last Annual Report, the object of the cross was to obtain a plant with the tertiary branching habit of V. 5, but with the larger boll of V. 1. The reciprocal cross did not differ from the above.

On twenty plants flowers were selfed for the production of seeds for the F. 2 generation.

ARROWROOT.

FIELD EXPERIMENTS.

The arrowroot cultivation was divided into two sections, one being banked and the other cultivated 'on the flat'. It was found that the arrowroot on the banked piece gave a poorer return than that grown in the usual way. The figures are as follows: Banked land, 8,800 lb. rhizomes per acre, and 'flat' or unbanked land, 9,400 lb. rhizomes per acre.

This experiment proved, not only that arrowroot grown on banked land gives a comparatively poor return, but also that the rhizomes extend just as deeply underground in the banked as in the 'flat' method of cultivation. Hence banked land would be no better adapted to machine digging of the crop than 'flat' land.

The arrowroot plots were at first laid out with the two objects of carrying out trials with manures, and of obtaining data as to the difference in yield on 'flat'

* See *Journal of Agricultural Science*, Vol. II, No. 4.

versus banked land. In April 1914, however, more comprehensive trials for the comparison of the effects of different manures, as set forth in the accompanying table, were commenced at Spring estate, and so the effects of manuring the small plots at the Experiment Station were not taken into account.

ARROWROOT MANURIAL EXPERIMENTS AT SPRING ESTATE.

PLOTS $\frac{1}{10}$-ACRE EACH (IN DUPLICATE).

No. of plot.	Cotton-seed meal, lb. per acre.	Potash, lb. per acre.	Phosphoric acid, lb. per acre.
1	No manure	(Control)	
2	600	—	—
3	600	60	—
4	600	60	30
5	600	—	30
6	—	60	—
7	—	—	30
8	—	60	30

LABORATORY WORK.

There is a difference of opinion with regard to the attack of arrowroot by weevils. Some state that not only is arrowroot free from attack, but that weevils have an aversion for the starch: others say that weevils do occasionally attack arrowroot. To obtain definite data on the matter, tests were carried out in the laboratory. Some sample boxes and bottles were filled with arrowroot, and muslin tied over their mouths. Two of the receptacles served as controls, and into the remainder various species of weevils were placed.

The weevils experimented with, and the results obtained were as follows:—

Reecptacle.	Insects.	Results of examination 12, 11 and 13.	Results of examination 2, 6 and 14.
No. 1	Control	No insects	No insects
„ 2	12 corn weevils, adults (*Calandra oryzae*)	No insects. Discontinued	...
*			
„ 4	12 flour weevils, adults (A Dermestid)	Few dead weevils none living	...
„ 5	6 flour weevils, larvae	Few living adults no larvae	3 dead adults no larvae
„ 6	13 pollard weevils, adults (*Tribolium confusum*)	Few living adults no larvae	1 dead adult none living
„ 7	6 pollard weevils, larvae	Few living adults no larvae	4 dead adults 1 living adult

These experiments indicate that weevil larvae can exist and reach the adult stage in arrowroot starch, but they appear to be unable to breed in it, so there

* It was intended to place larvae of *C. oryza* in No. 3, but none could be obtained.

seems little possibility of weevils proving destructive to arrowroot. In cases where weevils have been found in barrels of the starch, their presence may be explained by the barrels having been used recently for flour, and probably the number of weevils would tend to decrease rather than increase.

A number of brown paper packages of arrowroot were also put up for periodic examination. When last examined they were free from insect attack of any kind.

CASSAVA.

Field Experiments

Two plots of cassava were grown with the object of ascertaining, with some degree of accuracy, the weight of green roots produced per acre. Like the arrowroot cultivation, in one section the cassava was grown on banks (which is the usual estate practice), whilst the other section was 'flat'. In both cases the cuttings were planted at 5′ × 2′. The results this season showed an increase of yield of 3,525 lb. per acre in favour of the 'flat' cultivation, the yields being at the rate of 17,570 lb. green roots per acre on the 'flat' cultivation, and 14,054 lb. on the banked land. The soil in the two plots was, so far as appearances go, of similar fertility, and the plants themselves were ordinary estate cuttings, so that there is every indication that the increased yield may be attributed to the method of cultivation. As, however, one season's results cannot be definitely relied upon, the same point will be tested in next year's experiments.

No selection work has been done with this crop, but it is proposed to make selections from amongst next season's plants.

Experimental Shipments of Dried Cassava Roots.

In order to test the market in Canada for dried cassava roots, a trial shipment of the article was made to the West India Company, Montreal.

The roots were sun-dried in galvanized wire mesh trays, such as are used in drying arrowroot starch. The average percentage of thoroughly dried roots was 38, although in some cases 40 per cent. was obtained. The product was shipped in ordinary cacao bags.

The calculations given are based upon the results of the trial shipment, together with the trial at the Experiment Station. As will be seen, the dried cassava roots realized $35 per Canadian ton of 2,000 lb. in Montreal. The average estates yield of 10,000 lb. per acre was calculated from information given by a local planter, who cultivates a considerable area of cassava each season.

Summary of Data Concerning Dried Cassava Roots.

Results of trial shipment as per account sales.

		Cr.		
		$ c.	$	c.
By 11 bags dried cassava roots 1,457 lb. @ $35.00 per ton of 2,000 lb. ex rails, Toronto			25	50
		Dr.		
To Customs entry	...	1 00		
,, Ocean freight*	...	3 58		
,, Rail freight 1,430 lb. @ 38c. ...	...	5 43		
,, Commission on $25·50 @ 2½ % ...	...	64	10	65
Balance due			14	85

*The R.M.S.P. Co. has reduced the rates to to 30 c. per 100 lb. to Halifax, 54c. per 100 lb. through rates to Montreal, and 64 c. per 100 lb. through rates to Toronto.

Yields at Experiment Station, 1913:—

On Banks at rate of 14,000 lb. per acre

„ Flat „ „ „ 17,000 „ „ „

17,000 lb. would give @ 38 % 6,460 lb. dried roots, or approximately 3 tons of 2,000 lb.—gross value @ $35 $105 (£21 17*s.* 6*d.*) per acre. Net value in Kingstown @ $21·72 $65·16 (£13 11*s.* 6*d.*).
14,000 lb. would give @ 38 % 5,320 lb. dried roots, approximately 2½ tons of 2,000 lb. per acre—gross value @ $35 $87·50 or £16 4*s.* 6*d.* and net value in Kingstown @ $21·72 $54·30 (£11 6*s.* 3*d.*).

Average yield on Estates 10,000 lb.
10,000 lb. would yield @ 38 % 3,800 lb. dried roots—gross value $66·50 (£13 17*s.*). Net value at $21·72 $41·26 (£8 11*s.* 11*d.*).

How net value in Kingstown of 1 ton was estimated.
Value of 1 ton of 2,000 lb. in Montreal $35·00 (£7 5*s.* 10*d.*).

Freight @ 54 c. per 100 lb.	$10·80		
Customs entry	1·00		
Commission @ 2½ %	88		
Lighterage, etc.	60		
	$ 13·28	13·28	(£2 15*s.* 4*d.*).
Net value in Kingstown		21·72	(£4 10*s.* 6*d.*).

COMPARISON OF PRICES OF DRIED CASSAVA ROOTS AND CASSAVA STARCH.

The following figures show that when cassava starch is selling at $6·85 per barrel of 220 lb. in Trinidad, the value is on a par with dried cassava roots at $35 per ton in Montreal. In other words, when cassava starch is selling at *over* 3c. per lb. in Trinidad, or *over* 2½c. per lb. in the Colony, it is more profitable to manufacture starch than to sell the dried roots.

In this comparison no allowance has been made either for depreciation of machinery, or the difference in cost of labour in the preparation of the two products. Such allowance would need a more accurate estimate than I feel in a position to give, but would undoubtedly, at least in the matter of machinery, be in favour of the manufacture of the dried roots.

The starch extraction by weight from the green roots is placed at 17 per cent., which is calculated from information given by local starch manufacturers. Details of calculations:—

5,000 lb. green roots yield { 2,000 lb. (1 Canadian ton) dried roots or 850 lb. starch.

Therefore for the selling price to be on a par with dried roots @ $35 in Montreal ($21·72 in Kingstown), the starch should realize $6·85 per barrel of 220 lb. in Trinidad ($5·60 per barrel in Kingstown).

The net value of the starch has been calculated from account sales, the charges per barrel, when shipped to Trinidad, being as follows:—

	Cr.			
		$ c.	$ c.	
By 1 barrel of cassava starch			6 85	
	Dr.			
To freight		24		
„ Export duty		12		
„ Import „		50		
„ Porterage		5		
„ Commission @ 5 %		34	1 25	
Value in Kingstown			5 60	

PEANUTS.

TRIAL SHIPMENTS OF PEANUTS.

Trial shipments of peanuts were made by the Department to both the United States and Canada. The results were not satisfactory.

High charges and freight quite shut out the United States as a market for St. Vincent peanuts.

The shipment sent to Canada realized 5½c. per ℔. in Montreal.

The following is an extract from the report of the West India Company, Montreal, to whom the nuts were sent :—

'There is practically no demand here for these nuts in the shell, but if you can get your people to shell them, we should be able to do a good business, as at present we annually bring into Canada a very large quantity of shelled peanuts from Java, Borneo, China, Japan and other countries. We place the value of your nuts shelled, to-day, at 6½c. per ℔., in bond, at Montreal.'

A sample of nuts similar to the above shipment realized 6¼c. in Trinidad. So long as peanuts can be disposed of at this figure in the West Indies, there is little likelihood of a trade in this product being established between this Colony and Canada.

Under these circumstances it is not thought worth while to publish a detailed account of the shipment.

SUGAR-CANE.

The following varieties were grown for distribution : B. 147, B. 208, D. 109 B. 1753, D. 95, B. 376, B. 4596, Sealy Seedling, B. 1528, B. 6450, B. 3696, B. 109.

SWEET POTATOES.

The following varieties, obtained from Montserrat, are grown for distribution ; Jim Gage, Silly, Trinidad, Blue Bell, Barbados Barrel, Geranium, Shiprock, Gentleman's Table, White Gilkes, Elijah, North No. 1, North No. 2, North No. 3, North No. 4, Jackass, Chibble, Victoria, Francis, Bet Weeks, Red Bourbon.

GREEN DRESSINGS.

The following are grown and seeds kept on hand at the Experiment Station for distribution : Bengal Bean, Lyon Bean, Woolly Pyrol, Jerusalem Pea, Sunn Hemp, a few varieties of cowpeas, and the Soja Bean (*Tephrosia candida*).

The last named was sown on some cotton plots in 1911 and it came up thickly, without resowing, after the cotton crop was reaped in the two following years. The plant does not flower in the short time between the two cotton crops, so that some of the seeds must have remained dormant in the soil for over two years before germinating.

STOCK IMPROVEMENT.

With the object of sustaining and further improving the strain of milch cows in the Colony, a Holstein Friesian bull was imported from Barbados on October 5, 1913. During the period between his arrival in the Colony and the end of March the services numbered forty-six.

The fee charged for each service is 2*s.* 6*d.*

Pests and Diseases and Their Control.

Cotton.

THE SMALL BRONZE BEETLE (*Colapsis fastidiosa*). For many years much difficulty has been experienced in establishing cotton in some fields in the Windward District, owing to the attacks of this small bronze beetle which devours the seedlings wholesale. Fortunately its attacks seem to be somewhat limited both in area and duration. Its ravages have been most severe in a few fields on Diamond and Ratho Mill estates, and it is also fairly prevalent in the Grenadines, especially Bequia. Although, in severe attacks, the first sowings are almost entirely demolished, yet a 'stand' can usually be obtained eventually, for the beetle seems to disappear after about three weeks of activity. Nothing is known of the larval stage of the insect, notwithstanding that several attempts have been made to induce it to pass through its life-cycle under laboratory conditions. A heavy dusting of lime through infected fields appeared to do some good. Attempts to capture the beetle by means of lights in the fields at night, failed.

The cotton worm (*Alabama argillacea*) was again in evidence, but was taken well in hand before doing much damage.

THE BLACK SCALE (*Saissetia nigra*). This scale was a serious cotton pest only where wild trees, prone to its attacks, were allowed to grow unmolested in the vicinity of the cotton fields. Such trees include the almond, sugar apple, and hibiscus. In a few localities limited areas of cotton were covered by these insects, and in every such case the source of infection could be traced to trees growing near by.

The white scale (*Hemichionaspis minor*), as a cotton pest, is only to be reckoned with in the Grenadines on Marie Galante cotton. The efforts made of late years, especially in Union Island, to induce the people to cut the trees as low as possible, are having some effect on the control of this pest.

Angular spot and anthracnose were very prevalent during the wet harvesting season. More care in thinning, especially in the wetter cotton districts, and selection of seed from plants least susceptible to these diseases, seem to be the only hope of minimising the harm done done by them.

'DAMPING-OFF' FUNGUS. In the wetter parts of the Experiment Station many seedlings were killed by either *Pythium debaryanum*, or a disease similar in its mode of attack. Where this occurs, as long a time as possible should elapse between the preparation of land and the sowing of the seed, especially if much organic matter has been buried.

Arrowroot.

The arrowroot worm (*Calpodes ethlius*) was in evidence but did little damage. A Tachinid parasite attacked the pest in appreciable numbers in some localities.

Cyclocephala vincentae has now been identified as the insect responsible for the boring of rhizomes of arrowroot on Diamond estate. For several years the rhizomes have been attacked by a small grub, which eats its way into them. The

damage arises, not so much from the amount of the rhizomes eaten, but from the fact that the holes made become filled with soil, which cannot be removed in the ordinary washing, the consequence being an inferior and dirty starch. From experiments carried out it was found that the beetle is attracted to lights in the field : this method of capturing the adult should be persevered with.

Cassava.

On one estate a field of cassava was so badly infested with mealy-bug that the crop was entirely spoiled. The thrips reported last year as attacking the cassava at the Experiment Station were again in evidence, and they have also been noticed in many other parts of the island. So far, the harm done has been too slight to warrant any control measures being undertaken, but if the thrips should appear in the early stages of growth, instead of when the plants have almost reached maturity they might be badly crippled, and some means of combating the insects would become necessary.

The thrips collected last year at the Experiment Station were forwarded for identification to Mr. C. B. Williams, B.A., F.E.S., Entomologist at the John Innes Institution. Two species, both new, were found to be present. For one, it was found necessary to erect a new genus, and it has been named *Corynothrips stenoptera* : the other has received the name *Frankliniella melanommatus*.

Ground Nuts.

The green bug (*Edessa meditabunda*) was again troublesome on some estates. The most effective method of dealing with it was by hand-picking.

Wooly Pyrol.

The bean leaf roller (*Eudamus proteus*) attacked this crop. There was also another moth present in great quantities. This has been sent to the Head Office for identification.

Other insects collected and sent to the Head Office for identification were :—

(a) A moth (*Duomitus punctifer*) whose caterpillars were found tunnelling in branches of *Pithecolobium polycephalus*.

(b) A moth (*Hyblaea puera*, Cram.) the larvae of which feed on the leaves of the Pink Poui (*Tabebuia pentaphylla*).

(c) *Macrostola lutea* ? beetles in the inflorescences of *Philodendron giganteum* were probably this species. An interesting account of the species, and the part it plays in the fertilization of an aroid in Montserrat will be found in the *Agricultural News*, Vol. X, p. 234. The fungus spots, mentioned in the account referred to, were not present on any of the spathes of *P. giganteum* examined..

(d) *Euthisanotia amaryllidis*, the lily worm, was very persistent in its attacks on Crinums at the Experiment Station.

(e) A Tachnid fly, a parasite of *Calpodes ethlius*.

(f) *Tribolium* sp., the pollard weevil.

(g) A Dermestid, the flour weevil.

(h) A hymenopteron, parasite of the mango shield scale.

(i) Several species of termites were collected by Mr. Sands, and forwarded to the Head Office. The following were identified, and the names published in the *Agricultural News*, Vol. XIII, No. 309, p. 74 : *Calotermes balloui*, *Eutermes sanctaeluciae*.

Millions.

During the rainy season, the 'millions' (*Girardinus poeciloides*) kept in the streams at the Botanic Gardens were washed away. In February, a fresh supply was received from the Imperial Department, and supplies were sent to Medical District 2 and Medical District 3, to restock the Buccament River, and to place a colony in each of the Cumberland and Calliaqua Rivers, and the Brighton swamps. A stock supply of these fish is kept at the Experiment Station for distribution to any districts where they may be required.

Progress in the Chief Industries.

COTTON.

Again a wet harvesting season did much damage to the crop, which in September was very promising. More rain fell in November 1913 than even during the same month last season, but in December and January the rainfall was not so heavy as during the last month of 1912, and the first of 1913.

Table of rainfall at five stations in cotton districts during the harvesting period :—

Month.	Agricultural Experiment Station.	Cane Grove.	Petit Bordel.	Botanic Station.	Ratho Mill.
1913.					
November ...	13·99	15·15	10·20	15·55	10·90
December ...	2·94	4·92	3·90	5·52	4·12
1914.					
January ...	3·05	2·95	1·80	4·50	1·83
Total ...	19·98	23·02	15·90	25·57	16·85

Table of the estimated weight and value of last season's exported crop compared with that of two previous seasons :—

COTTON CROPS.

Product.	1911-12.		1912-13.		1913-14.	
	Quantity.	Value, £.	Quantity.	Value, £.	Quantity.	Value, £.
Sea Island cotton	487,116 lb.	38,563	428,032 lb.	33,886	399,187 lb.	31,626
Marie Galante ...	46,822 „	1,951	58,737 „	2,080	58,737 „	2,447
Cotton seed ...	700 tons	3,500	640 tons	3,200	524 tons	3,054
Total		44,014		39,166		37,127

The average price of St. Vincent Sea Island cotton in 1911-12, 1912-13, and 1913-14 was estimated at 19*d.* per lb. The Marie Galante cotton was estimated at 10*d.* per lb. in 1911-12, 8½*d.* per lb. in 1912-13, and at 10*d.* in 1913-14. Cotton seed was placed at an all-round value of £5 10*s.* per ton.

Area Planted and Yield per Acre.

The area under cultivation was 3,768 acres of Sea Island and 1,238 acres of Marie Galante. This is a decrease on the previous season of 576 acres in the case of Sea Island, and an increase of 138 acres in the case of Marie Galante, being a decrease of 438 acres in the total area under cotton.

The yield of Sea Island per acre works out at 106 lb. of lint, which is slightly better than that for the last two seasons. The yield of Marie Galante works out at 47 lb. per acre, which is well up to the average.

In the Southern Grenadines more attention was given by a few growers to Sea Island cotton, and the results were very promising, both as regards yield and quality of lint.

The following table shows the acreage planted in Sea Island cotton in each of the past nine seasons, the yield of lint, and yield per acre :—

Crop.	Area planted, acres.	Weight of lint, lb.	Yield of lint per acre, lb.
1905-6	790	137,460	174
1906-7	1,533	268,275	175
1907-8	3,200	432,000	135
1908-9	3,000	372,000	124
1909-10	2,528	356,139	141
1910-11	3,587	561,526	156
1911-12	5,068	487,116	96
1912-13	4,344	428,032	98
1913-14	3,768	399,187	106

Average yield of lint per acre for nine years, 134 lb.

The following are the details of the Marie Galante crop for three seasons :—

Crop.	Area planted, acres.	Total yield, lb.	Yield per acre, lb.	Estimated value, £.
1911-12	1,037	46,822	45	1,951
1912-13	1,100	58,737	53	2,080
1913-14	1,238	58,737	47	2,447

Government Central Cotton Ginnery.

The following figures were kindly furnished by the Superintendent of the Ginnery :—

Kind.	Weight of seed-cotton in lb.	Weight of lint obtained in lb.	Percentage of lint to seed-cotton.	Percentage of stained lint to white.
From estates :—				
Sea Island (white) ...	445,354	116,353	26·1	
do. (stained) ...	116,495	29,319	25·1	25·2
Purchased from small growers :—				
Sea Island (white) ...	260,431	68,655	26·3	
do. (stained) ...	56,912	14,692	25·8	21·4
Purchased at Union Island, Canouan, and Mayreau :—				
Marie Galante (white) ...	182,439	47,013	25·7	
do. (stained)	19,135	5,120	26·7	10·8

The large percentage of stained to white lint is again the result of unfavourable weather.

STARCH INDUSTRY.

The following table shows the exports and value of arrowroot and cassava starch during the past six years :—

Year.	Arrowroot in lb.	Value, £.	Cassava starch in lb.	Value, £.
1908	4,886,379	27,713	236,502	1,352
1909	5,594,098	31,792	195,166	1,009
1910	5,302,725	30,089	138,112	781
1911	4,254,130	40,430	121,562	1,269
1912	3,948,681	48,854	177,820	1,287
1913	4,327,036	53,607	227,206	6,570

CACAO INDUSTRY.

Exports of cured cacao for the past six years :—

Year.			Weight in lb.
1908	..	...	218,664
1909	...	...	241,294
1910	..	...	235,236
1911	...	...	285,869
1912	...	...	223,373
1913	...	...	213,684

Progress in Minor Industries.

COCO-NUTS.

The planting of coco-nuts was still continued, about 29,000 being imported for the purpose.

GROUND NUTS.

The export of ground nuts has still further increased. The figures for three years are 3,683 bushels in 1911, 4,080 bushels in 1912, and 6,181 bushels in 1913.

Earlier in the report an account will be found of trial shipments of peanuts made by the Department to test the Canadian market for this product.

AGRICULTURAL WORK IN THE COLONY.

Periodical visits were paid to out-districts by the Agricultural Superintendent and the Assistant Agricultural Superintendent. The cotton competition, and efforts to establish a lime industry in the Grenadines, details of both of which are given below, entailed a fair amount of travelling.

Special attention was paid to addressing meetings of the small holders at convenient centres.

COTTON-GROWING COMPETITION.

With the object of improving the methods of cultivation, cotton-growing competitions for small growers were held in the chief cotton districts of the island.

The rules, made as simple as possible, were framed with the object of inducing competitors to adopt improved cultural methods. For example: 'In judging, particular attention will be given to the following points :—

'Thoroughness of cultivation ; manuring ; draining to prevent wash ; thinning and spacing ; condition of crop. The Judges will consider the circumstances of each cultivation as well as the cultivation itself, including the implements used.'

Pigeon peas as wind-breaks, and Indian corn in every other row, in holes not less than 6 feet apart, were allowed, but no further intercropping was permissible.

Competitors were placed in two classes as follows :—

Class I. For the best Sea Island cotton cultivation of not less than 1 acre on a small holding over 5, but not exceeding 10 acres.
1st prize $10·00, 2nd $5·00.

Class II. For the best Sea Island cotton cultivation of not less than ½-acre on a small holding not exceeding 5 acres.
1st prize $10·00, 2nd $5·00, 3rd $3·00.

The cultivation entered for competition must be in one piece, but a road, river, or gully may run through it.

The report by the Agricultural Superintendent on the competition contained the following interesting information in connexion with it :—

In May, meetings were held at the various centres, where the Agricultural Superintendent addressed the small holders, explaining the objects and rules of the competitions, and giving advice on methods of cultivation such as manuring; draining to prevent wash; thinning and spacing; the control of pests. An average number of sixty small holders attended the meetings. There were thirty competitors, twenty-one in Class I, and eighteen in Class II. Six competitors in Class I and eight in Class II received prizes. To those prize-winners who received 80 per cent. or over of the total number of marks, the Imperial Commissioner awarded Diplomas of Merit.

The prizes aggregated $90, and were distributed by His Honour the Administrator, the Imperial Commissioner being also present at the prize distribution at Stubbs.

There was a marked effort on the part of those competing to follow the advice given by the Agricultural Superintendent in his addresses.

A distinct improvement was noticed in many instances in taking precautions to prevent wash by means of head drains; in the thinning and spacing of plants; and in general cleanliness of the cultivations. All this will undoubtedly tend towards a better system of cultivation, both by the actual competitors, and also by others not competing, for many opportunities occurred where the judges were able practically to illustrate the advantages of following the advice of the Agricultural Officers, many of the competitors' well thinned plots contrasting favourably with indifferently thinned plots near by. A competition on similar lines will probably be held next season.

VISITS TO THE GRENADINES.

The Assistant Agricultural Superintendent made three visits to the Grenadines, namely, in April and August 1913, and in January 1914, in connexion with agricultural matters; he also made several additional visits to Bequia. The visit in January was for the purpose of examining and reporting upon the prospects of establishing a lime industry in the Kays.

The following is a copy of his report :—

'A proposal to attempt the establishment of a lime industry in some of the St. Vincent Grenadines has recently been put forward by His Honour the Administrator, and the subject was mentioned to the Imperial Commissioner of Agriculture when he last visited this Colony. It was suggested that the first measures to be undertaken were to ascertain as far as possible what pests and diseases of Citrus are already in the islands named, and to get some idea of the islands and localities

suitable for the growth of limes. With these objects in view I visited Bequia, Mustique, Union Island, Mayreau, and Canouan in the order named, between January 7, and 15.

'A visit was also made to Carriacou in order to study the conditions existing where limes are being successfully cultivated.

'*Bequia, January 7.* At Spring and Industry estates, properties of Mr. Edwin Richards, about a dozen lime trees were seen, quite free from insect pests and apparently from disease. On an adjoining estate, Cinnamon Gardens, belonging to the same proprietor, some lime seeds had been sown in what was meant to be their permanent positions. None, however, had germinated up to date, and are not likely to do so while the drought prevails.

'I have since seen Mr. Richards and advised him to start a lime nursery in time for sowing at the commencement at the rainy season, and to transplant the limes to their permanent positions.

'The limes growing on the trees at Spring appear to be a good variety, and there should be no difficulty in obtaining sufficient seed from them, and so minimising the danger of introducing pests with imported seeds or plants.

'The spot chosen for the lime plantation seems suitable for the purpose, especially if a judicious system of planting wind-breaks were carried out.

'Near Mr. Rice's residence at Union there was seen a full-grown lime tree badly attacked by the white scale (*Chionaspis citri*).

'Several citrus trees are growing at Tony Gibbons, and some, chiefly oranges, were attacked by the green scale (*Coccus viridis*). The West Indian red scale (*Selonaspidus articulatus*) was also present in great quantities.

'*Mustique, January 8.* Several old lime trees are growing in this island. Most of them were free from pests, but a few were attacked by the wax scale (*Ceroplastes* sp.), probably *C. floridensis*, and also by the green scale. This latter was evidently parasitized by an insect, probably one of the small hymenoptera, for many scales were punctured. Infected twigs were obtained, but I have not succeeded in getting specimens of the parasite.

'Limes could, I should think, be grown quite successfully at Mustique.

'*Union Island, January 10-14.* Perhaps the district most suited for limes is Chatham estate. The soil in most parts is of fair depth, and is a dark loam, very similar to the soil in which limes are thriving at Carriacou. Chatham faces west and is thus protected from the prevailing winds. It would, however, be advisable to plant a wind-break on the ridge between the lands at Bloody Bay and Chatham. I have not yet spoken on the subject to Mr. Jones, the occupant of Chatham, but I believe he is willing to make a fairly extensive trial of limes. He is a capable man, who would be likely to enter into the thing thoroughly.

'Richmond estate and Bloody Bay lands would probably also suit limes, but these are less protected from the wind.

'On the leeward coasts of the island, limes could be planted as boundaries to allotments, but I do not advise the universal adoption of this system, as it would be unlikely to succeed in the wind-swept districts.

'It is advisable that young plants should be reared in the island. A suitable place for a small nursery is to the south-east of Clifton House, where it would be sheltered from high winds.

'The method of planting adopted by Mr. Archer in Carriacou, is to plant the limes between the cotton at 20′ × 20′. This would perhaps be the most suitable plan generally for Union Island, provided sufficient care were taken to prevent the cotton from damaging the young limes. I recommend this, not as being the best for the limes, but as the only practical means, under the circumstances, to get

limes planted on a sufficiently large scale to be worth while. Wherever possible, as in new lands, the limes should be planted without any intercropping, except possibly a leguminous cover crop.

'*Canouan, January 15.* There are a few lime trees scattered over this island. They are healthy, and produce fair crops of fair quality. The establishment of a plantation would not be difficult, and should prove remunerative.

'It will be gathered from the above that three species of scale insects that attack limes are present in one or other of the islands, namely, *Chionaspis citri*, *Coccus viridis*, and *Ceroplastes floridensis*. The purple scale (*Lepidosphes beckii*) may not be present, for none was found.

'None of the trees in the islands under consideration showed signs of "die-back", which is attributed to an unidentified root disease.'

COTTON AND OTHER HERBARIUM SPECIMENS COLLECTED.

During the visit in connexion with the lime industry, the following cotton specimens were collected by Mr. Birkinshaw. The first three were collected at Union Island and are distinct types of Marie Galante. The specimens were taken to Kew by Mr. Sands for identification.

(1) The ordinary type of Marie Galante. Identified at Kew as *Gossypium barbadense*, Linn.*

(2) Locally known as 'silk cotton'. This bears rather better lint than the ordinary Marie Galante, but is very similar in other respects. Identified at Kew as *G. barbadense*, Linn.

(3) Called 'Caraiacou Marie Galante' in Union Island. A robust type with large leaves and flowers. The lint is very short, and the type is not a desirable one from the growers' standpoint. Identified at Kew as *G. peruvianum*, Cav., or a hybrid with that species.

(4) A wild or semi-wild type, collected with that species at Canouan on the cliffs above Billy Holy, near Point de Jour, was identified at Kew as *G. punctatum*, var. Jamaica.

An aroid, which grows on rocky precipitous hill-sides in St. Vincent, was collected by the Assistant Superintendent, and taken to Kew with the cotton specimens. It was identified as *Philodendron giganteum*, Schott.

AGRICULTURAL PUPILS.

Since the reorganization of the Department, details of which will be found in last year's report, six pupils have been kept on the books for a course of two years' training at the Experiment Station. Their training is to a large extent practical, but, as far as possible, one hour per day is devoted to indoor instruction on agricultural theory.

EXHIBITION AT TORONTO.

A representative exhibit sent to the Toronto National Exhibition included the following articles:—

Cotton, lint and seed; arrowroot and cassava starches; cassava dried chips; Bengal beans and meal.

*See *Kew Bulletin*, 1914, No. 5, p. 199.

Details of Staff and Administration.

The Agricultural Superintendent acted as Honorary Secretary of the Agricultural and Commercial Society, Honorary Correspondent to the *West India Committee Circular*, member of the Committee for the Registration of Agricultural Credit Societies on the Raiffeisen system, member of the Advisory Committee to the Central Cotton Ginnery, and member of the Permanent Exhibition Committee.

The following papers, illustrated by photographs, were written by the Agricultural Superintendent for publication in the *West Indian Bulletin*: The 'Tri-Tri', or West Indian White Bait in St. Vincent; Method of Working Small Holdings under the Land Settlement Scheme, St. Vincent. The Agricultural Superintendent also prepared an interesting series of photographs, illustrating the Sea Island cotton industry of the Colony.

The Assistant Superintendent acted as Honorary Secretary of the Permanent Exhibition Committee, and Honorary Treasurer of the Agricultural and Commercial Society.

Mr. S. L. Moseley, late foreman at the Experiment Station, and formerly Assistant Master at the Agricultural School, was appointed Superintendent of the Experiment Farm, Agricultural Department, Sierra Leone, on April 29.

Mr. F. Simmons was appointed foreman at the Experiment Station as successor to Mr. Moseley.

Copies of the following publications were distributed free to planters and others: *West Indian Bulletin*, Vol. XIII, Nos. 1-4; Report on the Agricultural Department 1912-13.

ADDITIONS TO THE LIBRARY.

The *Cotton Plant in Egypt* formed a useful addition to the Library.

Besides the publications of the Imperial Department of Agriculture, the following were regularly received: The *Review of Applied Entomology* (Agricultural and Veterinary Series); *Kew Bulletin; Bulletin of the Imperial Institute; Tropical Agriculturist; Gardeners' Chronicle; Trinidad Bulletin of Miscellaneous Information; Journal* of the Jamaica Agricultural Society; *Agricultural Bulletin* of the Straits and Federated Malay States; Circulars and *Agricultural Journal* of the Royal Botanic Gardens, Ceylon; *Gleanings in Bee Culture*, A. I. Root Co., Medina, Ohio; *Experiment Station Record*, U.S. Department of Agriculture; Reports of the Porto Rico Agricultural Experiment Station; *Official Bulletin* of the Cuban Agricultural Department; *Agricultural Review* of the Philippine Department of Agriculture; *Bulletin of the Bureau of Agricultural Intelligence and Plant Diseases*; *Proceedings* of the Agricultural Society of Trinidad and Tobago.

ADDITIONS AND REPAIRS TO BUILDINGS.

The Assistant Agricultural Superintendent's residence at the Experiment Station was repaired and painted.

EXPENDITURE, RECEIPTS, SALES OF PLANTS. ETC.

The sum of £1,657 from local funds was voted for the upkeep of the Department, and of this £1,612 7*s*. was spent—a saving of £44 13*s*.

The following are the details of expenditure :—

	£	s.	d.
Salary, horse and travelling allowance, Agric. Supt.	300	0	0
„ „ „ „ „ Asst. Supt.	206	6	4
Upkeep Botanic and Experiment Stations	527	2	2
Salaries and travelling allowances, Government Veterinary Surgeon and Govt. Vaccinating Officer	340	0	0
Other Charges, Govt. Veterinary Department	171	5	2
Agricultural pupils allowances	67	13	4
Total	£1,612	7	0

From the unexpended balance on March 31, 1913, of the Imperial Grant-in-Aid of the Agricultural Department, the sum of £45 18*s*. 6*d*. was spent on special services, as follows :—

	£	s.	d.
Chemicals and apparatus for laboratory, etc.	9	4	7
Cotton and other experiments	20	18	10
Photographic materials	3	10	8
Microscope	12	4	5
Total	£45	18	6

The receipts for sale of plants and produce at the Botanic and Experiment Stations amounted to £22 19*s*. 11*d*.

METEOROLOGICAL OBSERVATIONS.

In May 1913, at the suggestion of the Agricultural Superintendent, the meteorological instruments were removed from the Botanic Station, and re-erected at the Experiment Station. The reason for the transfer is that the Experiment Station is nearer Kingstown, and it was felt that the meteorological records in the vicinity of the chief town would be of wider interest than those of a place a mile distant, where, owing to various factors, the records by no means represent the climatic conditions of Kingstown. To mention only one instance, the rainfall at the Botanic Station is much higher than that in Kingstown.

The rainfall for 1913 at the Experiment Station amounted to 97·03 inches.

RAINFALL FOR THE YEAR 1913.

Month.	Inches.
January	9·71
February	3·18
March	4·28
April	2·87
May	2·47
June	8·41
July	6·43
August	10·98
September	12·95
October	18·80
November	13·99
December	2·94
Total	97·03

The following table gives the mean monthly rainfall of the past thirteen years, 1901-13 :—

MEAN MONTHLY RAINFALL, 1901-13.

Month.	Inches.
January	5·61
February	3·47
March	4·01
April	3·25
May	6·55
June	11·04
July	10·26
August	10·57
September	10·24
October	10·98
November	8·64
December	8·68
Total	93·30

It will be seen that April had the lowest average rainfall, namely, 3·25 inches, and June the highest, namely, 11·04 inches.

Complete rainfall returns for 1913 were received from thirteen stations, and are given below :—

Station.	Rainfall in inches.
1. Botanic Station	121·64
2. Three Rivers	117·44
3. Cane Grove	110·57
4. Carib Country	99·96
5. Agric. Experiment Station	97·03
6. Petit Bordel	94·54
7. Georgetown	94·13
8. Cumberland	88·88
9. Peters Hope	85·15
10. Ratho Mill	74·41
11. Villa Point	71·95
12. Bequia	62·56
13. Union Island	40·20

The monthly returns were published regularly in the Government *Gazette*.

TEMPERATURE.

The mean monthly shade temperature at the Experiment Station was 78·5° F. September was the hottest month, with a temperature of 80·5° F. January was the coolest month, with 73·3° F.

ATMOSPHERIC PRESSURE.

The readings of the barometer corrected for instrumental error, elevation, and temperature ranged between 30·181 inches on February 16, and 29·841 inches on September 3.

OFFICIAL VISITS TO THE STATION.

His Excellency the Governor visited the Gardens on several occasions, and His Honour the Administrator inspected both the Gardens and the Experiment Station.

Dr. Watts, C.M.G., Imperial Commissioner of Agriculture, paid many visits to the Gardens and Experiment Station. He was in the Colony from December 16 to 22, during which period he was present at the distribution of prizes at Stubbs in connexion with the cotton-growing competition.

The Entomologist and Mycologist called in passing on January 15, and Mr. Ballou again on February 12.

Mr. R. Gill, Assistant Agricultural Superintendent in Southern Nigeria, and Mr. D. Scotland, Assistant Director of Agriculture in Sierra Leone, visited the Colony between December 8 and 16 in order to study the agricultural conditions in the West Indies. Besides their inspection of the work under the direct control of the Agricultural Department, they were taken by the Agricultural Superintendent and Assistant Agricultural Superintendent to many parts of the Colony likely to be interesting and instructive from an agricultural standpoint.

One visit was to the Linley Valley allotments, in which they showed considerable interest.

(Sgd.) FRANK BIRKINSHAW,

Acting Agricultural Superintendent.

Report of the Government Veterinary Surgeon, St. Vincent,

For the Year ended March 31, 1914.

The total sum expended was £511 5*s.* 2*d.*, made up as follows:—

	£	s.	d.
Disposal of carcases	80	0	0
Anthrax vaccine and appliances	34	15	3
Rent of office	16	5	0
Messenger	12	10	0
Telephone	5	16	0
Salary and travelling allowance for Government Veterinary Surgeon	250	0	0
Salary and Travelling Allowance for Government Vaccinating Officer	90	0	0
Clerical Assistant to Government Veterinary Surgeon	18	10	0
Contingencies		18	11
Special Services	2	10	0
	511	5	2
The fees collected for exportation of stock amounted to	35	1	6

EXAMINATION OF EARS.

During the year 851 ears and 285 blood smears, made by the police constables at Georgetown and Colonarie, were forwarded to the Laboratory.

Only two cases of anthrax were diagnosed during the year. Both of these occurred in cattle pastured at Pauls, situated at the back of Kingstown. Immediately these cases were discovered, the owner of the pasture was interviewed and, as a result, the owners of all bovines renting pasture at Pauls were notified that if their animals were not submitted for vaccination within twenty-four hours, they would have to be removed. This had the desired effect, for all animals pastured within a certain radius of the infected area were artificially inoculated, and up to March 31, no more cases had occurred.

It may be interesting to state that these cases occurred immediately after a heavy rainfall. Pauls is particularly favourable to the growth and spread of anthrax, the land being low-lying, swampy, and shaded. I have been led to understand that previous to the measures adopted by the Government for the control of this disease, anthrax carcases were often flayed on this pasture. Although there does not appear to be any fear of the disease assuming an epizootic form, it is reasonable to expect that cases will occur from time to time.

VACCINATION

During the period under review 1,868 animals were inoculated with single anthrax vaccine, as a precautionary measure. The use of this single serum has entirely replaced the double serums formerly used.

EXPORTATION OF LIVE STOCK.

Certificates were granted for the exportation of 383 head of live stock to the neighbouring colonies of Barbados, Trinidad, Grenada, and St. Lucia. This does not cover the Colony's entire export trade in live stock, as sheep, goats and pigs exported to Trinidad, as well as animals from the Grenadines, do not come under the observation of this Department.

IMPORTATION OF LIVE STOCK.

Four steamers and twenty sailing vessels were boarded, and fifty-one animals examined. The animals examined, and the ports from which they arrived, were as follows :—

7 cattle, 3 horses, 5 mules, 5 goats, 4 pigs from Barbados,
1 bull and 2 pigs from Trinidad,
1 horse, 1 mule and 3 pigs from Grenada.
1 cow and 2 horses from Carriacou,
2 cattle and 1 horse from St. Lucia.
12 sheep (rams) from Canada, and 1 horse from the United States of America

Among the imported animals special mention should be made of the pure-bred Holstein-Freisian bull Prince Patrick, imported by the Agricultural Department and placed on service at the Experiment Station at the nominal fee of 2*s.* 6*d.*

The services of such an animal were very much required by stock breeders, particularly those residing in the Kingstown district. The introduction of the Holstein-Freisian was recommended with a view to breeding a class of cow with longer and better nipples than those of the Ayreshire. Many of the calves of the 'Duke of Truro' had such small nipples that great difficulty was experienced in milking them with their first-born, and several developed into chronic kickers.

STATISTICAL INFORMATION.

Six tables are annexed, giving full information with regard to general mortality, stock exports, etc.

Table A shows the districts in which deaths among stock occurred from causes other than anthrax.

Table B shows the districts in which deaths among stock occurred, the causes of which could not be ascertained owing to decomposition of ears.

Table C shows the number of deaths on estates compared with the general mortality.

Table D shows the number, kind, and value of stock exported for which certificates were granted, and the colonies to which they were exported.

Table E shows the total number and kind of animals vaccinated and the districts in which they were done.

Table F shows the number of deaths in each year from 1907-8 to 1913-14.

OTHER INFORMATION.

During the year Mr. P. T. Saunders, Veterinary Officer to the Imperial Department of Agriculture, made an official visit to the Colony. During his stay the writer had the opportunity of discussing several points and supplying specimens and information, which I am pleased to see Mr. Saunders has made use of in a report entitled A Veterinary Survey of the Windward and Leeward Islands.

(Sgd.) C. P. STOUTE.

Government Veterinary Surgeon,
St. Vincent.

TABLE A. SHOWING DEATHS IN DISTRICTS FROM OTHER CAUSES THAN ANTHRAX.

District.	Cattle.	Horses.	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
Kingstown ...	117	9	1	13	12	86	90	328
Calliaqua	33	6	0	15	1	11	8	74
Mesopotamia ...	85	7	2	32	28	25	41	220
Colonarie	48	6	2	32	20	21	17	146
Georgetown ...	35	10	4	13	14	39	33	139
Layou	36	6	1	10	9	17	14	93
Barrouallie ...	26	3	0	3	6	31	6	75
Chateaubelair ...	12	4	0	13	2	16	14	61
Total	392	51	10	131	92	237	223	1,136

TABLE B. SHOWING DISTRICTS IN WHICH DEATHS OCCURRED THE CAUSE OF WHICH WAS NOT ASCERTAINED.

District.	Cattle.	Horses	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
Kingstown ...	2	0	0	0	0	1	0	3
Calliaqua	0	0	0	0	0	0	0	0
Mesopotamia ...	1	0	0	0	0	0	0	1
Colonarie	0	0	0	0	0	0	0	0
Georgetown ...	0	0	0	0	0	0	0	0
Layou	0	1	0	1	0	0	3	5
Barrouallie ...	4	0	0	0	1	0	0	5
Chateaubelair ...	1	0	0	0	0	0	0	1
Total	8	1	0	1	1	1	3	15

TABLE C. SHOWING DEATHS ON ESTATES COMPARED WITH TOTAL MORTALITY.

Class.	On Estates.	
Cattle	111	400
Horses	4	52
Mules	6	10
Asses	7	132
Sheep	47	93
Goats	6	238
Pigs	26	226
	217	1,151

TABLE D. SHOWING NUMBER, KIND, AND VALUE OF STOCK EXPORTED FOR WHICH CERTIFICATES WERE GRANTED.

Description.	Barbados.		Grenada.		St. Lucia.		Trinidad.		Total.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.	No.	Value.
		£		£		£		£		£
Cattle	157	785	6	30	141	705	8	40	312	1,550
Horses	4	80	2	50	0		0		6	130
Mules	0		0		0		3	45	3	45
Asses	15	45	0		0		32	96	47	141
Sheep	9	4	0		0		0		9	4
Goats	6	1	0		0		0		6	1
	191	915	8	80	141	705	43	181	338	1,871

TABLE E. SHOWING NUMBER OF ANIMALS VACCINATED IN EACH DISTRICT DURING THE YEAR.

District.	Cattle.	Horses.	Mules.	Asses.	Sheep.	Goats.	Pigs.	Total.
Kingstown ...	142	2	3	40	0	0	0	187
Calliaqua	158	0	0	1	0	0	0	159
Mesopotamia ...	902	1	3	9	0	0	0	915
Colonaire	81	0	0	0	0	0	0	81
Georgetown ...	103	2	0	0	0	0	0	105
Layou	243	0	0	0	0	0	0	243
Barrouallie ...	21	0	0	0	0	0	0	21
Chateaubelair ...	149	0	0	8	0	0	0	157
Total	1,799	5	6	58	0	0	0	1,868

TABLE F. SHOWING THE TOTAL NUMBER OF DEATHS FROM ANTHRAX FOR THE YEARS INDICATED.

1907-8	590
1908-9	298
1909-10	312
1910-11	264
1911-12	10
1912-13	0
1913-14	2
Total	1,476

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